

ECOJECT[®] SYSTEM[®]

World's Best Tree Injection System

ECOJECT[®] SYSTEM & TREEAZIN[®] SYSTEMIC INSECTICIDE USER MANUAL



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BioForest

Established in 1996, **BioForest** specializes in innovative product development, and consulting strategies for urban and commercial forest protection. BioForest is headquartered in Sault Ste. Marie, Ontario with a presence in Toronto, Ontario, Prince Albert, Saskatchewan, Sault Ste. Marie, Michigan and Fordland, Missouri. BioForest's experienced and knowledgeable staff work with clients to create and implement effective pest management and forest health strategies for urban forests, commercial forests, woodlots, cottage properties, municipalities and more.

BioForest is the registrant of TreeAzin, a systemic insecticide that provides up to two years' protection against emerald ash borer and other insect pests in Canada and the United States. TreeAzin was developed for treating threatened trees in urban forests and environmentally sensitive areas. BioForest also developed an industry leading microinjection system, the EcoJect System, used to apply TreeAzin into high value trees. BioForest is the exclusive Canadian distributor of Arbotect® 20-S, a preventive fungicide Macro-Injection treatment against Dutch elm disease, and is the exclusive North American distributor of Rotstop® C, a biological fungicide used to prevent the introduction and spread of Heterobasidion Root Disease (root rot) in pine trees.

BioForest's purpose is to save trees from invasive pests and disease while having minimal impact on the surrounding environment. Using a science based approach, BioForest is committed to implementing effective pest management and forest health strategies.

EcoJect System and TreeAzin Systemic Insecticide User Manual

The EcoJect System is a safe and simple microinjection tool for injecting TreeAzin Systemic Insecticide into trees.

The EcoJect System consists of three main components: the Nozzle, the Canister, and the Pump. EcoJect System components must be used together.

The use of non-EcoJect System parts will void any warranty or guarantee on all parts. The EcoJect System warranty will be null and void if the EcoJect System is used with any formulation other than TreeAzin Systemic Insecticide, without prior written consent from BioForest. Due to health and safety concerns, BioForest will not service or handle any EcoJect System parts, including refurbishing canisters, found to have been used with any other formulation.

Never use water to clean EcoJect Nozzles, Canisters, or Pump. Do not allow water to come in contact with TreeAzin Systemic Insecticide.

WARNING: Read this manual in its entirety, including all warning and safety statements, prior to using the EcoJect System.

EcoJect[®] SYSTEM USER MANUAL

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EcoJect System Components

The EcoJect System consists of three main components: the Nozzle, the Canister and the Pump.

EcoJect Nozzle

- The narrow end of an EcoJect Nozzle is inserted into a pre-drilled injection site in a tree
- The wide end of an EcoJect Nozzle is used to securely push the Nozzle into the pre-drilled injection site and is mated with a loaded Canister
- Additional EcoJect Nozzles can be purchased, in packs of 12, from BioForest
- A clean, sharp 15/64 inch high helix drill bit is required for drilling injection sites
- High helix drill bits are included in all EcoJect System Kits
- Additional high helix drill bits can be purchased from BioForest



EcoJect Nozzle

EcoJect Canister

- 8 mL and 20 mL EcoJect Canisters are included with each EcoJect System Kit
- EcoJect Canisters are reusable and reloadable in the field
- EcoJect Canisters are self-sealing and, therefore, removable during the injection process
- EcoJect Canisters are not disposable
- The self-sealing valve in each EcoJect Canister has an average life of 30 injections
- EcoJect Canisters can be refurbished to original operating performance by returning used Canisters to BioForest (refurbishment fees will apply)
- Additional 8 mL and 20 mL EcoJect Canisters can be purchased, in packs of 12, from BioForest



20 mL and 8 mL

EcoJect Canisters with Nozzles

EcoJect Pump

- The EcoJect Pump is used to load Canisters
- The EcoJect Pump consists of three main components:
 - EcoJect Manifold
 - EcoJect Loading Gun
 - EcoJect Cylinder
- The EcoJect Manifold and Loading Gun are designed to fit any size Cylinder
- The EcoJect Cylinder is available in three different sizes:
 - 3L Cylinder: holds three litres of TreeAzin and allows one operator to load Canisters
 - 6L Cylinder: holds six litres of TreeAzin and allows two operators to load Canisters simultaneously
 - 12L Cylinder: holds 12 litres of TreeAzin and allows four operators to load Canisters simultaneously
- The EcoJect Pump must be pressurized with compressed air between 100 and 150 PSI
- The EcoJect Pump can be pressurized by an air source such as an air compressor or portable air tank, with a recommended output of 125-150 PSI



EcoJect Manifold



EcoJect Loading Gun



3L, 12L, 6L
EcoJect Cylinders



The EcoJect 3L Pump with 1 1/4" wrench and funnel

DANGER: Ensure any external air source used to pressurize the EcoJect Pump does not exceed a maximum output of 200 PSI.

Equipment Requirements

You will need these items to inject trees in the field

Equipment supplied in the EcoJect System Kit:

- EcoJect System User Manual
- EcoJect System Components
 - EcoJect Nozzles
 - EcoJect Canisters
 - EcoJect Pump
- Small diameter (<0.027 inch) gauge wire to clean debris from the EcoJect Loading Gun and Nozzles
- Schrader Valve Assembly, if pressurizing EcoJect Pump, with a fitting designed to fill tires
- 1 1/4 inch wrench for securing the EcoJect Manifold to and for removing the Manifold from the Cylinder
- Clean, sharp 15/64 inch high helix drill bits for drilling injection sites
- Loading Gun repair kit
- Tag wire
- Five spare rubber O-rings
- Diameter tape for measuring tree diameter at breast height
- Funnel for pouring TreeAzin and EcoJect Cleaner into the Cylinder
- Grafting wax for filling injection sites once the injection has concluded
- Eye and hand protection as indicated on the TreeAzin label

Equipment not supplied in the EcoJect System Kit:

- Air Source, with recommended output of 125-150 PSI, example:
 - Air compressor
 - Portable air tank
- Battery operated hand drill, at least 18V, with extra charged batteries
- Hammer for gently tapping EcoJect Nozzles into and removing Nozzles from an injection site
- Appropriate protective clothing as indicated on the TreeAzin label
- Field box for carrying EcoJect Canisters and Nozzles, drill bits, and additional equipment
- EcoJect Cleaner and rags or paper towels for flushing and cleaning the EcoJect Pump, Canisters, and Nozzles
- Extra container for soaking EcoJect Nozzles in Cleaner between injections (cleans and sterilizes Nozzles)

Wear Eye Protection



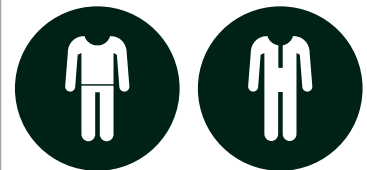
Goggles or face shield

Wear Hand Protection



Chemical-resistant gloves

Wear Protective Clothing



Long sleeved shirt and pants
or coveralls

WARNING: Applicators and other handlers must wear long sleeved shirt and pants; shoes plus socks; protective eyewear and chemical resistant gloves.

IMPORTANT: Wash hands before eating, drinking, chewing gum, using tobacco or the toilet.

IMPORTANT: Remove clothing immediately if product soaks through or gets underneath, then wash thoroughly.

EcoJect System Instructions

Loading EcoJect Pump (10 Steps)



1. Using a funnel, fill the EcoJect Cylinder with TreeAzin. Do not exceed maximum product limit indicated on the front of the Cylinder.
2. Secure EcoJect Manifold to Cylinder. Ensure Manifold product hose is connected to the brass barbed fitting and inserted into the Cylinder. Use a 1 1/4 inch wrench to thread the Manifold approximately 1/8 of a turn past hand tight, being careful not to strip threads.
3. Ensure both the EcoJect Manifold product control valve and the Manifold air control valve are in the "off" position.
4. Connect one end of the loading hose to the EcoJect Manifold product control valve by firmly pressing it into the push-to-connect fitting. Ensure the other end of the loading hose is connected to the Loading Gun's push-to-connect fitting.
 - **WARNING:** Ensure both the EcoJect Manifold product control valve and Manifold air control valve are in the "off" position to avoid exposure to a pressurized pesticide.
5. Attach desired air source to the EcoJect Manifold air control valve. Use supplied Schrader Valve Assembly if necessary.
 - **DANGER:** Ensure air source maximum output does not exceed 200 PSI.
 - **IMPORTANT:** Air source must be drained of water before connecting to EcoJect Manifold.



6. Slowly turn EcoJect Manifold air control valve to "on" position and monitor Manifold pressure gauge.
 - **WARNING:** Ensure the EcoJect System's internal pressure does not exceed 150 PSI.
7. Once the EcoJect Cylinder has pressurized to between 100 and 150 PSI, turn the Manifold air control valve to the "off" position. The air source may be disconnected at this time. Inspect all fittings for leaks.
 - If leaks are observed, follow the "EcoJect Pump does not hold pressure" instructions outlined in the "EcoJect System Troubleshooting" section
 - If no leaks are observed, proceed to step eight
8. Point the EcoJect Loading Gun tip into an empty TreeAzin bottle, or suitable, labelled container. Completely depress and hold the Loading Gun trigger.
9. With the EcoJect Loading Gun trigger depressed, slowly turn the Manifold product control valve to the "on" position for two to three seconds to prime the system and remove all air from the loading hose.
10. Once the loading hose is primed and free of air, release the EcoJect Loading Gun trigger and inspect all fittings for leaks.
 - If leaks are observed, follow the "EcoJect Pump does not hold pressure" instructions outlined in the "EcoJect System Troubleshooting" section
 - If no leaks are observed, proceed to the "Loading EcoJect Canisters" instructions

Loading EcoJect Canisters (3 Steps)



1. Mate Canister and Loading Gun



2. Depress and hold trigger to load



3. Release trigger and remove Canister

1. Mate an EcoJect Canister to the Loading Gun tip by completely inserting the needle into the Canister.
2. Completely depress and hold the EcoJect Loading Gun trigger until the Canister is fully loaded with TreeAzin.
 - **IMPORTANT:** Ensure EcoJect Loading Gun needle is seated completely in the Canister before depressing the Loading Gun trigger.
 - **IMPORTANT:** To avoid inconsistent TreeAzin volumes, watch the piston inside the Canister while loading. The Canister is full when the piston inside stops.
3. Release the EcoJect Loading Gun trigger and remove the Canister from the Loading Gun tip.
 - **IMPORTANT:** Ensure EcoJect Loading Gun trigger is not depressed when removing a loaded Canister from the Loading Gun tip.
 - **IMPORTANT:** Keep EcoJect Loading Gun trigger clean so it does not stick in a depressed state when removing a loaded Canister from the Loading Gun tip.

IMPORTANT: While loading EcoJect Canisters, maintain internal Pump pressure between 100 and 150 PSI. Operating the Pump with pressures outside of these parameters may result in inconsistent TreeAzin volumes.

IMPORTANT: The EcoJect Cylinder is empty when air bubbles are observed in the loading hose. To continue loading Canisters, depressurize the Pump, fill the EcoJect Cylinder with TreeAzin and pressurize again. Be sure to follow the "Depressurizing EcoJect Pump" and "Loading EcoJect Pump" instructions.

DANGER: Never remove the EcoJect Manifold or its fittings before following the "Depressurizing EcoJect Pump" instructions in this manual.

Depressurizing EcoJect Pump (10 Steps)



1. Turn valves "off"



2. Disconnect air source



3. Slowly open air control valve



4. Depressurize Pump



5. Turn product control valve "on"

1. To depressurize the EcoJect Pump, first ensure the Manifold product control valve and the Manifold air control valve are in the "off" position.
2. If connected, disconnect the air source from the EcoJect Manifold air control valve.
3. Slowly open the EcoJect Manifold air control valve to allow air to escape and the Pump's internal pressure to drop.
4. When the EcoJect Pump has been relieved of its internal pressure (pressure gauge reads zero), it has been depressurized.
5. Holding the EcoJect Loading Gun above the Manifold, turn the Manifold product control valve to the "on" position.

Depressurizing EcoJect Pump (Steps 6-10)

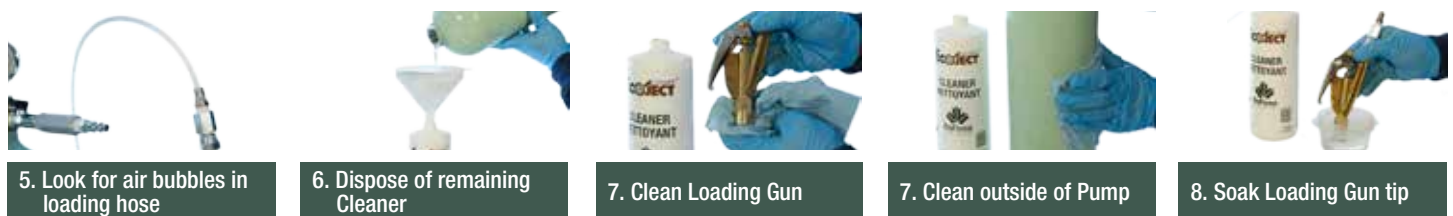


6. With a rag or paper towel, cover the EcoJect Loading Gun tip and depress the Loading Gun trigger. TreeAzin will bleed from the Loading Gun and loading hose back into the Cylinder.
7. Once all TreeAzin is out of the EcoJect Loading Gun and loading hose, turn the Manifold product control valve to the “off” position.
8. Remove the loading hose by depressing the blue collar on the EcoJect Manifold product control valve push-to-connect fitting and pulling the loading hose out.
9. Use a 1 1/4 inch wrench to remove the EcoJect Manifold from the Cylinder.
10. Using a funnel and fine sieve, pour any TreeAzin remaining in the EcoJect Cylinder into an empty TreeAzin bottle, or suitable, labelled, container for storage.

Cleaning EcoJect Pump (8 Steps)



1. Ensure the EcoJect Pump is depressurized, as outlined in the “Depressurizing EcoJect Pump” instructions, before removing the Manifold from the Cylinder.
2. Pour approximately 500 mL of EcoJect Cleaner into the Cylinder.
3. Pressurize the EcoJect Pump as outlined in steps two to seven of the “Loading EcoJect Pump” instructions.
4. Point the EcoJect Loading Gun tip into an empty Cleaner bottle, or suitable, labelled, disposal container. Completely depress and hold the Loading Gun trigger.



5. Once air bubbles are observed in the loading hose, depressurize the EcoJect Pump as outlined in the “Depressurizing EcoJect Pump” instructions.
6. Pour any EcoJect Cleaner remaining in the Cylinder into an empty Cleaner bottle, or suitable, labelled, disposal container.
7. With a disposable rag or paper towel and EcoJect Cleaner, wipe the outside of the Manifold, Loading Gun, and Cylinder.
8. Soak the Loading Gun tip in an EcoJect Cleaner bath for one to two minutes to ensure it is free of obstructions.

IMPORTANT: The EcoJect Pump should be cleaned at the end of each work day in order to maintain its functionality. To clean properly, cycle unused Cleaner through the Pump.

Determining Dose and EcoJect Canister Numbers

Use a diameter tape to determine tree diameter in centimeters at breast height (diameter at breast height (DBH) is measured 1.3 m above ground).

If treating an ash tree for emerald ash borer (EAB) within 25 km of a known infestation, begin treatment immediately at the maximum TreeAzin dose (5 mL / cm DBH).

If treating an ash tree for EAB outside 25 km of a known infestation, a preventive TreeAzin dose may be recommended (2-5 mL / cm DBH).

Contact the Canadian Food Inspection Agency (CFIA) to learn where EAB has been found.

For more information, see "Appendix A: Applicators Guide for Determining TreeAzin Systemic Insecticide Dose, Number of EcoJect Canisters, and Number of Injection Sites".

Example 1:

An ash tree is greater than 25 km from a known EAB infestation and is not exhibiting any EAB symptoms.

- The tree DBH is 22 cm
- A TreeAzin dose rate of 3 mL / cm DBH is to be used
- Target TreeAzin dose is 66 mL (22 cm DBH x 3 mL / cm DBH)
- Refer to "Appendix A: Applicators Guide for Determining TreeAzin Systemic Insecticide Dose, Number of EcoJect Canisters, and Number of Injection Sites" to determine number of Canisters and injection sites required
- Use six 8 mL EcoJect Canisters and one 20 mL EcoJect Canister at seven injection sites

3 mL / cm DBH Dose Rate Table				
Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
19	57	5	1	6
20	60	5	1	6
21	63	3	2	5
22	66	6	1	7
23	69	6	1	7
24	72	4	2	6
25	75	7	1	8

Excerpt from 3 mL / cm DBH TreeAzin Dose Chart (Appendix A)

Example 2:

An ash tree is less than 25 km from a known EAB infestation and is exhibiting suspicious EAB symptoms.

- The tree DBH is 30 cm
- Canopy thinning and/or dieback is assessed to be 10-20%
- A TreeAzin dose rate of 5 mL / cm DBH is to be used
- Target TreeAzin dose is 150 mL (30 cm DBH x 5 mL / cm DBH)
- Refer to "Appendix A: Applicators Guide for Determining TreeAzin Systemic Insecticide Dose, Number of EcoJect Canisters, and Number of Injection Sites" to determine number of Canisters and injection sites required
- Use one 8 mL EcoJect Canister and seven 20 mL EcoJect Canisters at eight injection sites

5 mL / cm DBH Dose Rate Table				
Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
27	135	2	6	8
28	140	0	7	7
29	145	1	7	8
30	150	1	7	8
31	155	2	7	9
32	160	0	8	8
33	165	1	8	9

Excerpt from 5 mL / cm DBH TreeAzin Dose Chart (Appendix A)

Preparing Injection Site (3 Steps)



1. Using an 18V battery operated hand drill and a clean, sharp $15/64$ inch high helix drill bit, drill an injection site at a slightly downward angle into the tree, approximately 10 cm above the ground.
 - **IMPORTANT:** Avoid placing injection sites in damaged areas on the trunk, such as in cracks or scars. Adjust injection sites to be slightly above or slightly beside any visible tree damage.
2. Once the drill bit has penetrated the bark, the injection site should be approximately 1 inch into the tree's sapwood tissue.
 - **IMPORTANT:** Do not exceed a depth of 1.5 inches into the sapwood.
3. Subsequent injection sites should be drilled approximately 13 to 15 cm apart around the tree, spiraling slightly upwards, so that the final injection site is no more than 30 cm above the ground.

IMPORTANT: Use a clean, sharp $15/64$ inch high helix drill bit to drill injection sites. A dull drill bit can damage xylem tissue, significantly slowing injection times.

IMPORTANT: Do not spin the drill bit excessively when drilling injection sites. This can damage xylem tissue, significantly slowing injection times and compromises the site's ability to compartmentalize the wound.

IMPORTANT: If a torque speed setting is available on the drill, set to a lower speed.

Injecting Trees (7 Steps)

IMPORTANT: Secure EcoJect Nozzles and Canisters in injection sites as they are drilled. It is not a good practice to drill injection sites in several trees before initiating injections.



1. Insert the narrow end of an EcoJect Nozzle into a pre-drilled injection site.
2. Secure the EcoJect Nozzle by pushing and twisting it by hand until snug, or gently tap the rim of the Nozzle with a hammer.
3. Place a loaded EcoJect Canister gently over the Nozzle and push until mated. The Canister should begin to discharge into the injection site.
4. Immediately check the injection site for signs of leakage.
 - If leakage is observed:
 - Carefully secure the loaded EcoJect Canister to the Nozzle by holding both with one hand
 - Use other hand to gently tap on the back of the loaded Canister
 - Ensure the loaded Canister and Nozzle do not become un-mated
 - Repeat if leakage continues

Injecting Trees (Steps 5-7)



5. Complete injection



6. Remove empty Canister



7. Place Nozzles in Cleaner bath

5. Repeat steps 1 to 4 for all required injection sites.
 - **IMPORTANT:** When an injection is complete, wait one to two minutes before removing the EcoJect Canister and Nozzle. This allows the injection site to depressurize and avoids TreeAzin spillage and possible exposure.
6. After waiting one to two minutes for an EcoJect Canister to depressurize, remove the Canister separately from its Nozzle. The Canister may now be reloaded. Repeat for remaining Canisters.
7. Remove EcoJect Nozzles from the tree and place in a Cleaner bath. This cleans and disinfects the Nozzles for reuse. Follow provincial regulations for disposal of used Cleaner.

WARNING: Remove the EcoJect Canister before removing the Nozzle from the tree. When removing a loaded Canister from a tree, hold the Nozzle in place to avoid accidentally removing the mated Canister and Nozzle together. This will prevent accidental discharge and exposure.

WARNING: When a loaded EcoJect Canister is removed from a tree, there is a chance that some TreeAzin will be discharged from the Nozzle that remains inserted in the tree. Applicators should be positioned to the side of the Canister to avoid exposure.



EcoJect System Warranty

Used with TreeAzin Systemic Insecticide, the EcoJect System is guaranteed against manufacturing defects for one year from the date of purchase. Defective components of the EcoJect System will be replaced within three to five business days. An EcoJect System parts list is provided in Appendix B.

The EcoJect System warranty will be null and void if the EcoJect System is used with any product other than TreeAzin Systemic Insecticide or with any fittings other than those supplied by BioForest, without prior written consent from BioForest.

EcoJect Canister self-sealing valves have an average life of 30 injections. Canister self-sealing valves are not covered by the EcoJect System Warranty, but can be refurbished to original operating performance by returning used Canisters to BioForest (refurbishment fees will apply).

Never use water to clean the EcoJect Nozzles, Canisters, or Pump. Do not allow water to come in contact with TreeAzin Systemic Insecticide.

EcoJect System Maintenance

The EcoJect Pump, Canisters, and Nozzles require regular cleaning to ensure safe and efficient tree injections and to reduce equipment failures. Unless otherwise stated, it is imperative that components of the EcoJect System be cleaned at the end of each work day. Cleaning and additional maintenance procedures include:

- Use EcoJect Cleaner and a disposable paper towel to wipe the outside of the Pump, Manifold, Loading Gun, and each Canister at the end of each work day
- Flush the EcoJect Pump with Cleaner at the end of each work day to ensure optimal operation see “Cleaning EcoJect Pump” for complete cleaning instructions
- EcoJect Cleaner used to clean Canisters and Nozzles should not be used to clean the Pump
- Remove as much EcoJect Cleaner as possible from the Cylinder prior to filling it with TreeAzin
- Check that all EcoJect Pump fittings are not leaking
- Always use the supplied EcoJect Cylinder cap during transport to avoid debris entering the Cylinder
- Do not store TreeAzin in the EcoJect Cylinder or Canisters for more than 12 hours
- Use a funnel and fine sieve to pour any TreeAzin remaining in the EcoJect Cylinder into an empty TreeAzin bottle, or suitable, labelled, container for storage
- Flush EcoJect Canisters with Cleaner prior to any prolonged storage
- Do not store the EcoJect Pump, Canisters or Nozzles in damp areas



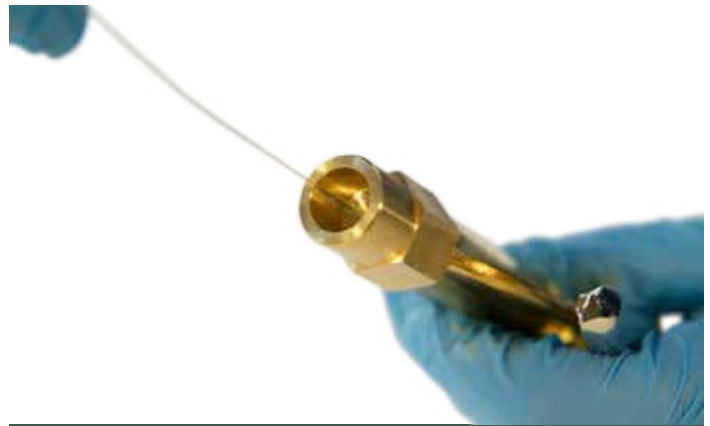
EcoJect System Troubleshooting

EcoJect Loading Gun Seems To Be Clogged

Remove Debris with Wire

If allowed into the EcoJect Pump, debris can cause the EcoJect Loading Gun to clog. To remove debris:

1. Ensure EcoJect Manifold product control valve is in the “off” position.
2. Insert a small diameter (less than 0.027 inches) gauge wire into the EcoJect Loading Gun tip to attempt to clear debris, and remove wire.
3. Turn EcoJect Manifold product control valve to the “on” position. Point the Loading Gun into an empty TreeAzin bottle, or suitable, labelled, container. Completely depress the Loading Gun trigger.
4. Repeat until the debris is cleared.



Loading Gun tip cleaned with narrow gauge wire

Remove EcoJect Loading Gun tip

If debris is not removed using wire, the EcoJect Loading Gun tip must be removed and cleaned. To remove the Loading Gun tip:

1. Depressurize the EcoJect Pump by following the “Depressurize EcoJect Pump” instructions.
2. Remove loading gun hose from the Manifold by pressing the blue collar towards the manifold and pulling the loading gun hose in the opposite direction.
3. Clean the EcoJect Loading Gun tip and Teflon fitting by placing them in a Cleaner bath.
4. Clean any visible debris from the EcoJect Loading Gun and Loading Gun tip.
5. Wrap EcoJect Loading Gun threads with Teflon tape four complete times, or coat with Loctite Threadlocker Blue 243™, before securing the Loading Gun tip onto the Loading Gun.



Loading Gun tip removed with 13/16” wrench

IMPORTANT: Before securing any fittings to the EcoJect Manifold or Loading Gun, be sure to wrap Teflon tape four complete times, or coat with Loctite Threadlocker Blue 243™, to ensure a good seal.

EcoJect Pump Does Not Hold Pressure

If the EcoJect Pump does not hold pressure, immediately take it out of service and check for leaks. To check fitting(s) for leaks:

1. Pressurize the EcoJect Pump by following the "Loading EcoJect Pump" instructions.
2. Apply a small amount of soapy mixture (1 part dish soap, 4 parts water) to EcoJect Manifold fittings and Cylinder neck.
3. If bubbles appear around the EcoJect Cylinder neck:
 - Follow the "Depressurize EcoJect Pump" instructions
 - Replace EcoJect Manifold O-ring (replacement O-rings are provided with each EcoJect System Kit)
 - Recheck for leaks
4. If bubbles appear around any of the EcoJect Manifold fittings:
 - Follow the "Depressurize EcoJect Pump" instructions and remove EcoJect Manifold
 - Remove leaking fitting(s)
 - Wrap fitting threads with Teflon tape four complete times, or coat with Loctite Threadlocker Blue 243™, before securing
 - Do not over-tighten any fitting(s)
 - Recheck for leaks
5. Clean excess soapy mixture with a paper towel.



Apply soapy mixture to Manifold and check for bubbles

IMPORTANT: Excessive tightening of any EcoJect Manifold fittings will damage the Pump.

EcoJect Canister Does Not Discharge Effectively

If the EcoJect Canister does not discharge effectively, the Nozzle may be clogged with debris.

Separate the EcoJect Canister from the Nozzle, remove and replace the Nozzle, and mate the Canister with the new Nozzle. Clean plugged Nozzles with a narrow (less than 0.027 inches) gauge wire.

Occasionally, some injection sites inject slower than others in the same tree. EcoJect Canisters can be moved to another site if this occurs. Relocate slow Canisters to another Nozzle where the injection is already complete, or drill a new injection site.



Nozzle cleaned with narrow gauge wire

IMPORTANT: Use a clean, sharp 15/64 inch high helix drill bit to drill injection sites. A dull drill bit can damage xylem tissue, significantly slowing injection times.

IMPORTANT: Do not spin the drill bit excessively when drilling injection sites. This can damage xylem tissue, significantly slowing injection times.

Appendix A: Applicators Guide

Determining TreeAzin Systemic Insecticide Dose, Number of EcoJect Canisters, and Number of Injection Sites

TreeAzin Systemic Insecticide Dose Chart

TreeAzin Systemic Insecticide (PCP 30559) is the most effective product for emerald ash borer (EAB) control in Canada. TreeAzin, derived from neem tree seed extracts (not neem oil), is not a neonicotinoid and is not from the avermectin family of pesticides. TreeAzin is classified as a "less hazardous" commercial pesticide by the Ontario Ministry of Environment (MOE) and is listed for organic use by the Organic Materials Review Institute (OMRI). EAB is a non-native pest that attacks all native species of true ash trees of any size and age. The larvae feed on the inner vascular tissues, cutting off water and nutrient flow to the canopy, while mature beetles feed on the leaves from June to August. TreeAzin provides up to two years' protection against EAB, can prevent EAB damage in healthy ash trees and significantly improves an ash tree's chance of survival if damage is not yet too severe. Over 99% of untreated ash trees will die.

Pest Controlled: Emerald Ash Borer

Less than 25 km from a known EAB infestation	EAB Infested	≥ 30% canopy thinning and/or dieback	Treatment not recommended
		< 30% canopy thinning and/or dieback	5 mL/cm DBH
	Suspicious EAB Symptoms or No EAB Symptoms	≥ 30% canopy thinning and/or dieback	5 mL/cm DBH*
		< 30% canopy thinning and/or dieback	5 mL/cm DBH
Greater than 25 km from a known EAB infestation	Suspicious EAB Symptoms	≥ 30% canopy thinning and/or dieback	5 mL/cm DBH*
		< 30% canopy thinning and/or dieback	5 mL/cm DBH
	No EAB Symptoms	> 40 cm DBH	4 mL/cm DBH
		20 - 40 cm DBH	3 mL/cm DBH
		< 20 cm DBH	2 mL/cm DBH

* Tree condition may compromise treatment effectiveness

Dosage and Other Insect Pests

TreeAzin Systemic Insecticide (PCP 30559) is registered in Canada for the following insect pests:

2 - 5 mL/cm DBH		3 mL/cm DBH			1 mL/cm DBH		
Emerald Ash Borer	Gypsy Moth	Tent Caterpillars	Arborvitae Leafminers	Budworms (Spruce & Jack Pine)	Sawflies (including: Yellowheaded Spruce Sawfly, Pine False Webworm, & Birch Leafminer)		
							

Treating for Emerald Ash Borer (EAB)

When within 25km of a known EAB infestation, begin treatments immediately on ash trees with or without suspicious EAB symptoms at the maximum dose (5 mL / cm DBH).

Delaying treatment could compromise treatment effectiveness and result in tree mortality.

Suspicious EAB symptoms include:

- Premature foliage yellowing
- Canopy thinning
- Dead branches
- Heavy seeding
- Epicormic shoots on main stem and/or major canopy branches
- Woodpecker and/or squirrel feeding
- Bark cracks and/or deformities

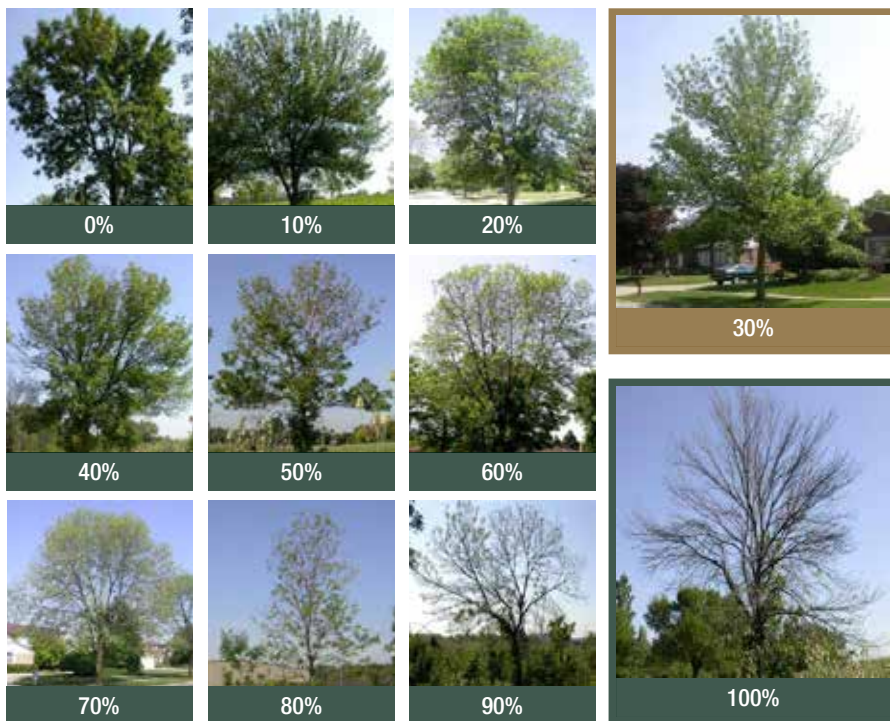
If D-shaped exit holes or S-shaped galleries are present, consider the tree "EAB Infested".

Common Signs and Symptoms of EAB

EAB infested ash trees may not initially show signs or symptoms. Early treatment prior to damage occurring greatly increases ash survival rates.



Tips for Determining Canopy Thinning and/or Dieback



- A **healthy** ash tree has a fully foliated canopy
- A **healthy** ash canopy may be thinner than canopies of other tree species, such as maple
- A **thinning** ash canopy does not have as many leaves as there ought to be, but all top branches exposed to sun have leaves
- An ash canopy with **dieback** has branches, exposed to sunlight, that are dead (have no leaves or new buds). Lower branches, not exposed to sunlight may naturally die and should not be considered.
- **≥ 30% canopy thinning and/or dieback** occurs when the combined effects of **thinning** and **dieback** result in >30% of the leaves that a **healthy** tree would have to be missing

When treating any tree with **≥ 30% canopy thinning and/or dieback**, the tree owner should be advised that tree condition may compromise treatment effectiveness.

Photos by: Dave Smitley, Michigan State University

5 mL / cm DBH Dose Rate Tables (Common EAB Dose)

Applicators guide for determining TreeAzin Systemic Insecticide target dose, numbers of 8 mL and 20 mL EcoJect Canisters, and number of injection sites per tree for a 5 mL / cm DBH dose rate.

Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
10	50	1	2	3
11	55	2	2	4
12	60	0	3	3
13	65	1	3	4
14	70	1	3	4
15	75	2	3	5
16	80	0	4	4
17	85	1	4	5
18	90	1	4	5
19	95	2	4	6
20	100	0	5	5
21	105	1	5	6
22	110	1	5	6
23	115	2	5	7
24	120	0	6	6
25	125	1	6	7
26	130	1	6	7
27	135	2	6	8
28	140	0	7	7
29	145	1	7	8
30	150	1	7	8
31	155	2	7	9
32	160	0	8	8
33	165	1	8	9
34	170	1	8	9
35	175	2	8	10
36	180	0	9	9
37	185	1	9	10
38	190	1	9	10
39	195	2	9	11
40	200	0	10	10
41	205	1	10	11
42	210	1	10	11
43	215	2	10	12
44	220	0	11	11
45	225	1	11	12
46	230	1	11	12
47	235	2	11	13
48	240	0	12	12
49	245	1	12	13
50	250	1	12	13
51	255	2	12	14
52	260	0	13	13
53	265	1	13	14
54	270	1	13	14
55	275	2	13	15

Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
56	280	0	14	14
57	285	1	14	15
58	290	1	14	15
59	295	2	14	16
60	300	0	15	15
61	305	1	15	16
62	310	1	15	16
63	315	2	15	17
64	320	0	16	16
65	325	1	16	17
66	330	1	16	17
67	335	2	16	18
68	340	0	17	17
69	345	1	17	18
70	350	1	17	18
71	355	2	17	19
72	360	0	18	18
73	365	1	18	19
74	370	1	18	19
75	375	2	18	20
76	380	0	19	19
77	385	1	19	20
78	390	1	19	20
79	395	2	19	21
80	400	0	20	20
81	405	1	20	21
82	410	1	20	21
83	415	2	20	22
84	420	0	21	21
85	425	1	21	22
86	430	1	21	22
87	435	2	21	23
88	440	0	22	22
89	445	1	22	23
90	450	1	22	23
91	455	2	22	24
92	460	0	23	23
93	465	1	23	24
94	470	1	23	24
95	475	2	23	25
96	480	0	24	24
97	485	1	24	25
98	490	1	24	25
99	495	2	24	26
100	500	0	25	25

4 mL / cm DBH Dose Rate Table

Applicators guide for determining TreeAzin Systemic Insecticide target dose, numbers of 8 mL and 20 mL EcoJect Canisters, and number of injection sites per tree for a **4 mL / cm DBH dose rate**.

4 mL / cm DBH Dose Rate Table				
Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
10	40	5	0	5
11	44	3	1	4
12	48	1	2	3
13	52	4	1	5
14	56	2	2	4
15	60	5	1	6
16	64	3	2	5
17	68	1	3	4
18	72	4	2	6
19	76	2	3	5
20	80	5	2	7
21	84	3	3	6
22	88	1	4	5
23	92	4	3	7
24	96	2	4	6
25	100	5	3	8
26	104	3	4	7
27	108	6	3	9
28	112	4	4	8
29	116	2	5	7
30	120	5	4	9
31	124	3	5	8
32	128	6	4	10
33	132	4	5	9
34	136	2	6	8
35	140	5	5	10
36	144	3	6	9
37	148	6	5	11
38	152	4	6	10
39	156	2	7	9
40	160	5	6	11
41	164	3	7	10
42	168	6	6	12
43	172	4	7	11
44	176	2	8	10
45	180	5	7	12
46	184	3	8	11
47	188	6	7	13
48	192	4	8	12
49	196	7	7	14
50	200	5	8	13
51	204	3	9	12
52	208	6	8	14
53	212	4	9	13
54	216	7	8	15
55	220	5	9	14

4 mL / cm DBH Dose Rate Table				
Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
56	224	3	10	13
57	228	6	9	15
58	232	4	10	14
59	236	7	9	16
60	240	5	10	15
61	244	3	11	14
62	248	6	10	16
63	252	4	11	15
64	256	7	10	17
65	260	5	11	16
66	264	8	10	18
67	268	6	11	17
68	272	4	12	16
69	276	7	11	18
70	280	5	12	17
71	284	8	11	19
72	288	6	12	18
73	292	4	13	17
74	296	7	12	19
75	300	5	13	18
76	304	8	12	20
77	308	6	13	19
78	312	9	12	21
79	316	7	13	20
80	320	5	14	19
81	324	8	13	21
82	328	6	14	20
83	332	9	13	22
84	336	7	14	21
85	340	5	15	20
86	344	8	14	22
87	348	6	15	21
88	352	9	14	23
89	356	7	15	22
90	360	10	14	24
91	364	8	15	23
92	368	6	16	22
93	372	9	15	24
94	376	7	16	23
95	380	10	15	25
96	384	8	16	24
97	388	6	17	23
98	392	9	16	25
99	396	7	17	24
100	400	10	16	26

3 mL / cm DBH Dose Rate Table

Applicators guide for determining TreeAzin Systemic Insecticide target dose, numbers of 8 mL and 20 mL EcoJect Canisters, and number of injection sites per tree for a **3 mL / cm DBH dose rate**.

Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
10	30	4	0	4
11	33	4	0	4
12	36	2	1	3
13	39	5	0	5
14	42	3	1	4
15	45	3	1	4
16	48	6	0	6
17	51	4	1	5
18	54	4	1	5
19	57	5	1	6
20	60	5	1	6
21	63	3	2	5
22	66	6	1	7
23	69	6	1	7
24	72	4	2	6
25	75	7	1	8
26	78	5	2	7
27	81	5	2	7
28	84	8	1	9
29	87	6	2	8
30	90	4	3	7
31	93	9	1	10
32	96	7	2	9
33	99	5	3	8
34	102	8	2	10
35	105	8	2	10
36	108	6	3	9
37	111	9	2	11
38	114	7	3	10
39	117	7	3	10
40	120	10	2	12
41	123	8	3	11
42	126	6	4	10
43	129	11	2	13
44	132	9	3	12
45	135	7	4	11
46	138	10	3	13
47	141	10	3	13
48	144	8	4	12
49	147	11	3	14
50	150	9	4	13
51	153	9	4	13
52	156	7	5	12
53	159	10	4	14
54	162	13	3	16
55	165	13	3	16

Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
56	168	11	4	15
57	171	9	5	14
58	174	12	4	16
59	177	12	4	16
60	180	10	5	15
61	183	8	6	14
62	186	11	5	16
63	189	11	5	16
64	192	9	6	15
65	195	12	5	17
66	198	15	4	19
67	201	15	4	19
68	204	13	5	18
69	207	11	6	17
70	210	14	5	19
71	213	14	5	19
72	216	12	6	18
73	219	15	5	20
74	222	18	4	22
75	225	18	4	22
76	228	16	5	21
77	231	14	6	20
78	234	17	5	22
79	237	17	5	22
80	240	15	6	21
81	243	18	5	23
82	246	21	4	25
83	249	21	4	25
84	252	19	5	24
85	255	17	6	23
86	258	20	5	25
87	261	20	5	25
88	264	18	6	24
89	267	16	7	23
90	270	19	6	25
91	273	19	6	25
92	276	17	7	24
93	279	15	8	23
94	282	18	7	25
95	285	18	7	25
96	288	16	8	24
97	291	14	9	23
98	294	17	8	25
99	297	17	8	25
100	300	15	9	24

2 mL / cm DBH Dose Rate Table

Applicators guide for determining TreeAzin Systemic Insecticide target dose, numbers of 8 mL and 20 mL EcoJect Canisters, and number of injection sites per tree for a **2 mL / cm DBH dose rate**.

2 mL / cm DBH Dose Rate Table				
Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
10	20	3	0	3
11	22	3	0	3
12	24	3	0	3
13	26	3	0	3
14	28	4	0	4
15	30	4	0	4
16	32	4	0	4
17	34	4	0	4
18	36	5	0	5
19	38	5	0	5
20	40	5	0	5
21	42	5	0	5
22	44	6	0	6
23	46	6	0	6
24	48	6	0	6
25	50	6	0	6
26	52	7	0	7
27	54	7	0	7
28	56	7	0	7
29	58	7	0	7
30	60	8	0	8
31	62	8	0	8
32	64	8	0	8
33	66	8	0	8
34	68	9	0	9
35	70	9	0	9
36	72	9	0	9
37	74	9	0	9
38	76	10	0	10
39	78	10	0	10
40	80	10	0	10
41	82	10	0	10
42	84	11	0	11
43	86	11	0	11
44	88	11	0	11
45	90	11	0	11
46	92	12	0	12
47	94	12	0	12
48	96	12	0	12
49	98	12	0	12
50	100	13	0	13
51	102	13	0	13
52	104	13	0	13
53	106	13	0	13
54	108	14	0	14
55	110	14	0	14

2 mL / cm DBH Dose Rate Table				
Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
56	112	14	0	14
57	114	14	0	14
58	116	15	0	15
59	118	15	0	15
60	120	15	0	15
61	122	15	0	15
62	124	16	0	16
63	126	16	0	16
64	128	16	0	16
65	130	16	0	16
66	132	17	0	17
67	134	17	0	17
68	136	17	0	17
69	138	17	0	17
70	140	18	0	18
71	142	18	0	18
72	144	18	0	18
73	146	18	0	18
74	148	19	0	19
75	150	19	0	19
76	152	19	0	19
77	154	19	0	19
78	156	20	0	20
79	158	20	0	20
80	160	20	0	20
81	162	20	0	20
82	164	21	0	21
83	166	21	0	21
84	168	21	0	21
85	170	21	0	21
86	172	22	0	22
87	174	22	0	22
88	176	22	0	22
89	178	22	0	22
90	180	23	0	23
91	182	23	0	23
92	184	23	0	23
93	186	23	0	23
94	188	24	0	24
95	190	24	0	24
96	192	24	0	24
97	194	24	0	24
98	196	25	0	25
99	198	25	0	25
100	200	25	0	25

1 mL / cm DBH Dose Rate Table

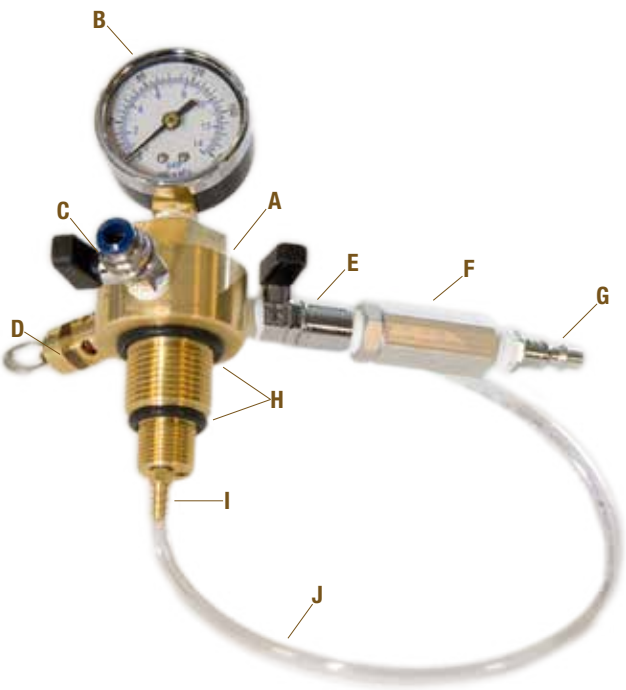
Applicators guide for determining TreeAzin Systemic Insecticide target dose, numbers of 8 mL and 20 mL EcoJect Canisters, and number of injection sites per tree for a **1 mL / cm DBH** dose rate.

1 mL / cm DBH Dose Rate Table				
Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
10	10	2	0	2
11	11	2	0	2
12	12	2	0	2
13	13	2	0	2
14	14	2	0	2
15	15	2	0	2
16	16	2	0	2
17	17	2	0	2
18	18	2	0	2
19	19	2	0	2
20	20	3	0	3
21	21	3	0	3
22	22	3	0	3
23	23	3	0	3
24	24	3	0	3
25	25	3	0	3
26	26	3	0	3
27	27	3	0	3
28	28	4	0	4
29	29	4	0	4
30	30	4	0	4
31	31	4	0	4
32	32	4	0	4
33	33	4	0	4
34	34	4	0	4
35	35	4	0	4
36	36	5	0	5
37	37	5	0	5
38	38	5	0	5
39	39	5	0	5
40	40	5	0	5
41	41	5	0	5
42	42	5	0	5
43	43	5	0	5
44	44	6	0	6
45	45	6	0	6
46	46	6	0	6
47	47	6	0	6
48	48	6	0	6
49	49	6	0	6
50	50	6	0	6
51	51	6	0	6
52	52	7	0	7
53	53	7	0	7
54	54	7	0	7
55	55	7	0	7

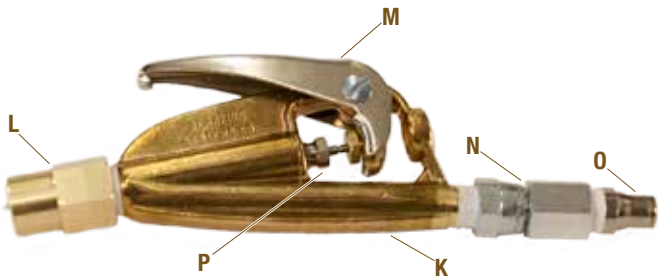
1 mL / cm DBH Dose Rate Table				
Tree DBH (cm)	TreeAzin Target Dose (mL)	Number of 8 mL Canisters	Number of 20 mL Canisters	Number of Injection Sites
56	56	7	0	7
57	57	7	0	7
58	58	7	0	7
59	59	7	0	7
60	60	8	0	8
61	61	8	0	8
62	62	8	0	8
63	63	8	0	8
64	64	8	0	8
65	65	8	0	8
66	66	8	0	8
67	67	8	0	8
68	68	9	0	9
69	69	9	0	9
70	70	9	0	9
71	71	9	0	9
72	72	9	0	9
73	73	9	0	9
74	74	9	0	9
75	75	9	0	9
76	76	10	0	10
77	77	10	0	10
78	78	10	0	10
79	79	10	0	10
80	80	10	0	10
81	81	10	0	10
82	82	10	0	10
83	83	10	0	10
84	84	11	0	11
85	85	11	0	11
86	86	11	0	11
87	87	11	0	11
88	88	11	0	11
89	89	11	0	11
90	90	11	0	11
91	91	11	0	11
92	92	12	0	12
93	93	12	0	12
94	94	12	0	12
95	95	12	0	12
96	96	12	0	12
97	97	12	0	12
98	98	12	0	12
99	99	12	0	12
100	100	13	0	13

Appendix B: EcoJect System Parts List

EcoJect Manifold Parts



EcoJect Loading Gun Parts



ITEM	DESCRIPTION
A	EcoJect Manifold
B	Manifold Gauge
C	Product control valve
D	Pressure release valve
E	Air control valve
F	Inline air filter
G	Male, quick connect air fitting
H	O-rings

ITEM	DESCRIPTION
I	Brass barbed fitting
J	Product hose
K	EcoJect Loading Gun
L	Loading Gun tip
M	Loading Gun trigger
N	Female mechanical pipe adaptor
O	Push-to-connect brass fitting
P	Tension control

Other EcoJect System Parts and Components

 3L, 12L, 6L EcoJect Cylinder	 20 mL EcoJect Canisters	 8 mL EcoJect Canisters	 EcoJect Nozzle	 DBH tape
 EcoJect Canister Refurbishment	 EcoJect Electric Pump Retrofit	 6, 4, 2 Person Multi-Loader Manifold	 Schrader Valve Assembly	 Safety Glasses
 1 1/4" Wrench	 15/64" High Helix Drill Bits	 Funnel	 Grafting wax	 Nitrile Gloves

EcoJect System available in three kit sizes to best suit your needs



Trees being injected with EcoJect System

3L Kit



Contents:

- 3 L EcoJect Pump
- 48 - 20 mL canisters
- 18 - 8 mL canisters
- 72 nozzles
- 1 canister loading gun
- Pro grade drill bits, DBH tape, PPE, & more

Fill rates*:

- 670 - 8 mL canisters / hr (5.4 L / hr)
- 417 - 20 mL canisters / hr (8.3 L / hr)
- 6 minute cylinder reload time

Ideal use:

- Smaller treatment programs and serving the residential market
- Maximum system portability
- Affordable entry into tree injections

3XL Kit



Contents:

- 3 L EcoJect Pump
- 144 - 20 mL canisters
- 48 - 8 mL canisters
- 204 nozzles
- 1 canister loading gun
- Pro grade drill bits, DBH tape, PPE, & more

Fill rates*:

- 670 - 8 mL canisters / hr (5.4 L / hr)
- 417 - 20 mL canisters / hr (8.3 L / hr)
- 6 minute cylinder reload time

Ideal use:

- Mid-sized treatment programs and serving the residential market
- Maximum system portability
- Enough canisters to equip a small crew

6L Kit



Contents:

- 6 L EcoJect Pump
- 264 - 20 mL canisters
- 96 - 8 mL canisters
- 372 nozzles
- 2 canister loading guns
- Pro grade drill bits, DBH tape, PPE, & more

Fill rates*:

- 1264 - 8 mL canisters / hr (10.1 L / hr)
- 763 - 20 mL canisters / hr (15.3 L / hr)
- 8 minute cylinder reload time

Ideal use:

- Large scale municipal treatment programs and serving the residential market
- Less time spent refilling cylinders
- Enough canisters to service large programs

* Canister fill rates based on laboratory testing, actual fill rates may vary. 6L Kit canister fill rates based on two operators loading simultaneously with multi-loader manifold attachment (included).



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